

What is claimed is:

- Sub B1
- 5 1. An isolated and purified F1-V DNA fragment which encodes all or a portion of F1 capsular antigen of *Yersinia pestis* and all or a portion of V antigen of *Yersinia pestis*.
- 10 2. An isolated and purified DNA fragment according to claim 1 wherein, F1 capsular antigen of *Y. pestis* is fused at its carboxyl terminal to amino acid terminus of V antigen of *Yersinia pestis*.
- 15 3. An isolated and purified DNA fragment according to claim 2, wherein said fragment has the sequence of SEQ ID NO:1 or a portion thereof, or an allelic portion thereof.
- 20 4. An isolated and purified F1-V DNA fragment according to claim 3 which encodes 521 amino acids or a portion thereof.
- Sub B2
- 20 5. The F1-V DNA fragment according to claim 4, wherein said DNA fragment encodes the amino acid sequence according to SEQ ID NO: 2 or a portion thereof.
- 25 6. A F1-V DNA fragment according to claim 2, comprising at least 30 nucleotides of the sequence set forth therein.
- Sub B3
- 25 7. A recombinant DNA construct comprising:
(i) a vector, and

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(ii) an isolated and purified F1-V DNA fragment which encodes all or a portion of F1 capsular antigen of *Yersinia pestis* and all or a portion of V antigen of *Yersinia pestis*.

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8. A recombinant DNA construct according to claim 7, wherein said DNA fragment encodes the amino acid sequence specified in SEQ ID NO:2.

9. A recombinant DNA construct according to claim 7, wherein said vector is an expression vector.

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10. The recombinant DNA construct according to claim 7, wherein said vector is a prokaryotic vector.

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11. A recombinant DNA construct according to claim 8 wherein said construct is pF1V.

12. A recombinant DNA construct according to claim 7, wherein said vector is a eukaryotic vector.

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13. A host cell transformed with a recombinant DNA construct comprising:

(i) a vector, and

(ii) a F1-V DNA fragment which encodes 521 amino acids of F1-V which encodes all or a portion of F1 capsular antigen of *Yersinia pestis* and all or a portion of V antigen of *Yersinia pestis*.

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14. A host cell according to claim 13, wherein said cell is prokaryotic.

15. A host cell according to claim 14, wherein said host cell is *E. coli BLR*.

16. A host cell according to claim 13, wherein said host is a virus.

5 Sub B5 17. A method for producing F1-V protein which comprises culturing host cells transformed with an expression vector containing a DNA fragment encoding all or a portion of F1 capsular protein of *Yersinia pestis* and all or a portion of V antigen of *Yersinia pestis*, under conditions such that said DNA fragment is expressed and said F1-V protein is thereby produced, and isolating said F1-V protein.

10 18. A F1-V protein comprising all or a portion of F1 capsular antigen of *Yersinia pestis* and all or a portion of V antigen of *Yersinia pestis*.

15 19. A F1-V protein according to claim 18 wherein said F1 capsular protein is fused at its carboxyl terminus to amino acid terminus of V antigen and having the amino acid sequence specified in SEQ ID NO:2.

20 20. An antibody to a peptide having the amino acid sequence specified in SEQ ID NO:2 or a portion thereof.

21. A vaccine protective against naturally occurring or genetically engineered *Yersinia pestis* subcutaneous and aerosol infection comprising F1-V protein comprising all or a portion of F1 capsular antigen of *Yersinia pestis* and all or a portion of V antigen of *Yersinia pestis* capable of eliciting protective antibodies against *Y. pestis* infection in a
25 pharmaceutically acceptable excipient in a pharmaceutically acceptable amount.

22. A vaccine protective against naturally occurring or genetically engineered *Yersinia pestis* according to claim 21 wherein, said *Y. pestis* is F1 deficient and V antigen altered.

5 23. A vaccine protective against naturally occurring or genetically engineered *Yersinia pestis* according to claim 21 wherein, said *Y. pestis* is F1 expressing and V antigen altered.

10 24. A vaccine for *Yersinia* infections comprising a F1-V protein comprising all or a portion of F1 capsular antigen of *Yersinia pestis* and all or a portion of V antigen of *Yersinia pestis* and all or a portion of *Yersinia enterocolitica* V antigen and all or a portion of *Yersinia pseudotuberculosis* V antigen capable of eliciting protective antibodies against *Yersinia* infection in a pharmaceutically acceptable excipient in a pharmaceutically acceptable amount.

15 25. A *Y. pestis* infection diagnostic kit comprising an antibody to a peptide having the amino acid sequence specified in SEQ ID NO:2 or a portion thereof and ancillary reagents suitable for use in detecting the presence or absence of F1 or V in a mammalian sample.

20 26. A therapeutic method for the treatment or amelioration of a *Y. pestis* infection comprising administering to an individual having such an infection an effective amount of antibodies to a peptide having the amino acid sequence specified in SEQ ID NO:2 or a portion thereof in a pharmaceutically acceptable dose in a pharmaceutically acceptable excipient.

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27. A method for the diagnosis of *Y. pestis* infections comprising the steps of:

(i) contacting a sample from an individual suspected of having a *Y. pestis* infection with an antibody to a F1-V protein comprising all or a portion of F1 capsular antigen of *Yersinia pestis* and all or a portion of V antigen of *Yersinia pestis*.; and

(ii) detecting the presence or absence of *Y. pestis* infection by detecting the presence or absence of a complex formed between said antibody and F1 and V antigens present in said sample.

28. A method for the diagnosis of *Y. pestis* infection comprising the steps of:

(i) contacting a sample from an individual suspected of having a *Y. pestis* infection with a F1-V protein comprising all or a portion of F1 capsular antigen of *Yersinia pestis* and all or a portion of V antigen of *Yersinia pestis*.; and

(ii) detecting the presence or absence of a *Y. pestis* infection by detecting the presence or absence of a complex formed between the F1-V protein and antibodies specific for F1 or V in the sample.

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